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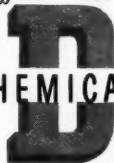
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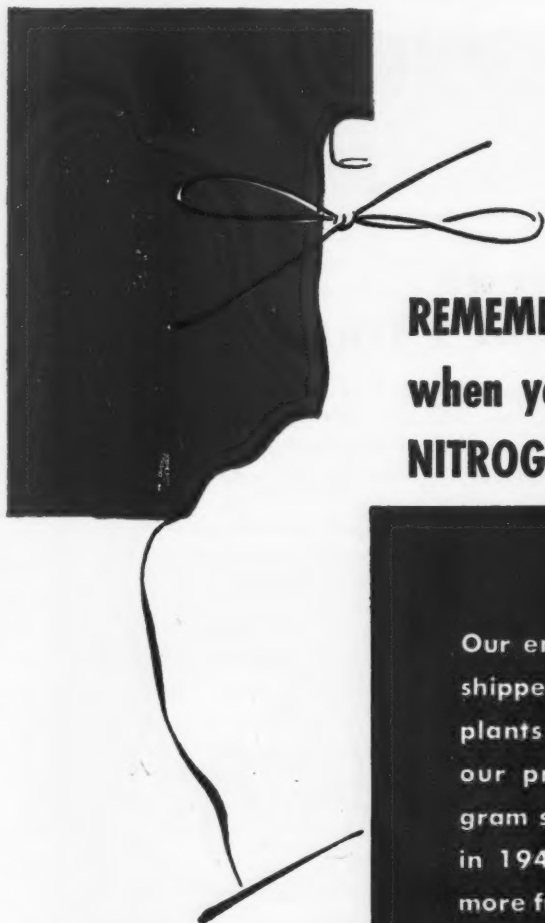
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LION OIL CO.  
El Dorado, Arkansas

# The American FERTILIZER

Vol. 111

JULY 23, 1949

No. 2

## Research and the Land\*

With Some Observations on Research Opportunities in the Fertilizer Business

BY VINCENT SAUCHELLI

*Director of Agricultural Research, The Davison Chemical Corporation, Baltimore, Md.*

I HAVE chosen for this occasion the subject of research and its impact upon the fertilizer business. I know you will forgive me for introducing a serious note into these more or less merry gatherings at this delightful seaside. But every effort will be made to harmonize what I say with the spirit of this gathering.

### Research, What Is It?

What is research? The dictionary says: "Research is a systematic study of certain phenomena by the experimental method." I prefer the definition that research is a state of mind, a question mark state of mind. It is that state of mind that accepts the fact that we do not know anything and have everything to learn about, let us say, fertilizers, plant nutrition, and soil physics and chemistry. We really do not know yet how plants feed and grow, how the same elements can make a giant Sequoia or a microscopic alga. If we but knew what makes a blade of grass grow we would be privy to Nature's secrets. Being what we are, God's own children, we should want to find out. That is the attitude that identifies the research man and entitles him to call his workshop or field plot a scientific laboratory. Research is the open mind with an honest desire to try to find out something.

We live in a world of continuous change. Scientific research undoubtedly is one of the most potent force in American life impelling change. Throughout this country are upward of several thousand industrial research laboratories employing a vast army of highly skilled scientific industrial research laboratories employing a vast army of highly skilled scientists at a cost of millions. Research has built the foundations of new and mighty industries: communication, aviation, radio, automotive, chemical synthesis. Great progress has been registered in all fields.

The fertilizer industry has also felt the necessity to get in step with this forward march of progress. Although some might want to carp at its rate of progress, it has, generally speaking, served the demands of the day quite adequately. Before the recent war the average annual consumption of fertilizers in this country was between 7 and 8 million tons. In 1948 production of commercial fertilizers increased to 16 million tons. The production capacity of both normal and concentrated superphosphates was more than doubled during this same period. Significant technological advances have been made by the nitrogen, potash, and the rock phosphate mining industries which are an integral part of the vast American fertilizer industry. Both at home and abroad, new continuous processes for the production of superphosphate and of complete, homogeneous fertilizers have

\*Paper presented at annual convention of Del-Mar-Va. Peninsula Fertilizer Association, Ocean City, Maryland, June 25, 1949.

been patented and some are in actual commercial production.

Many units in our fertilizer industry have been unwilling or unable to utilize many of the newest inventions in chemical engineering. Fortunately, we do have some leaders who are striking out boldly along new paths and setting the pace for the rest. You will pardon me if I refer with some justified pride to the technological improvements my Company has made in fertilizer manufacture, of which the granulation process is one outstanding example. This improvement is in line with the modern demands of a mechanized agriculture.

The fertilizer industry, starting humbly as a scavenger business despised and unappreciated, has within the last half century become one of the most important branches of the vast American chemical industry. It can proudly hold up its head among its chemical peers as one which, faithfully serving a basic need in the community, helps to protect and promote public health and the Nation's most important natural resource, our soil.

#### **Agricultural Teamwork Research**

A business is obliged to get a fresh growth to renew its life force or it will perish. For business anemia, that period when sales and profits are falling, the cure is not pep talks, price cuts and devious concessions. Such remedies soon peter out sadly and drive us along to the day of final disaster. The remedy is to discover and breed new business, improve the old, develop new products and create new outlets. In our industry we have the obligation to work closely with all the other agencies of agriculture, more particularly with the plant breeder, soil physicist and chemist, and plant physiologist, so as to integrate our developments with theirs to the end that a prosperous, progressive agriculture is achieved in the territory we serve. Ours also is the obligation to speed obsolescence of old style mixed goods, old inefficient equipment, and discredited sales policies. Why hesitate to keep off the scrap heap any article longer than it takes to replace it with a better one? This is not waste. It is waste when we cling too long to the old things such as outmoded fertilizer equipment, farm implements, grades, plant foods, and sales methods.

Teamwork in research is responsible for most of our recent progress. It is the order of the day. And we must become a part of the team. Farm problems are being looked at from broader viewpoints, and research

programs are being organized to include many phases, from soil care, fertilizer ratios and crop rotations, to the grading and packaging of both plant and animal products. You remember the story of the blind men and the elephant: One blind man put his hand on the elephant's side and described the animal as being like a wall. Another who ran his hand over the tail only, said that an elephant was like a rope. The one who fingered the animal's trunk concluded elephants were built like stovepipe elbows. That story is the classical way of cautioning us away from piecemeal research and emphasizing the need of seeing and trying to understand the whole. That is the secret of the success being achieved by teamwork research programs. It is the method which will get us far if we team up our fertilizer research with the other phases of the broad agricultural program.

#### **Fertilizer Research and Crop Production**

Progress in the agricultural sciences, including fertilizers, is steady but so relatively slow compared with that of other industries, that its effects are often lost sight of or little appreciated by the public-at-large. It takes years of experimentation in plant and animal breeding, soil and fertilizer problems, and in so many other phases of agriculture to get anywhere so that when the final result is achieved it cannot always be dramatized. For example, three-quarters of a century ago Mendel, the Austrian priest, discovered the fundamental law of heredity. Only within the past few decades have we seen the law applied in research in animal husbandry. The result is obvious now when we compare the fine beef and dairy breeds and swine of today with the big longhorns and razor backs we see in old prints of animal fairs of the past. By this comparison we realize how far research in genetics has advanced. And so with plant breeding—the hybrid corn of our day was, a few years ago, a curiosity. Dr. D. F. Jones at the New Haven (Connecticut) Station plugged along with his marvellous studies unnoticed and unsung. But within fifteen years hybrid corn has completely taken possession of the commercial corn acreage of the country and increased production at least a third more over the open-pollinated varieties. And what an unlooked for impact it has had on our fertilizer business. I'll refer to this again later on.

Let us now consider more closely what research specifically means to us, to you and me, in the fertilizer business. I said previously that agricultural research at times seems



to progress at a snail's pace. But over a long period of time it can and does effect revolutionary changes. Let me review briefly some events in the industry to illustrate this.

In 1925 such a thing as a synthetic ammonia solution industry was unknown. By 1948 over a third of the nitrogen used in the formulation of mixed fertilizers was derived from ammonia solutions. The trend is for an increasing use of these economical nitrogens. In 1900 about 90 per cent of the nitrogen used by the industry in mixtures was furnished by organic sources. Today less than 5 per cent comes from such sources.

Such a product as ammonium nitrate was, before the recent war, unknown to the fertilizer producer, or at least not considered suitable. Last year over 300,000 tons were utilized for agricultural purposes, with a considerable percentage used in formulations. Urea is another high analysis nitrogen that is a newcomer to the fertilizer industry.

In the field of phosphates we can report significant advances in the mining and processing phases. The development of furnace processes holds some hope for the production of new, high-analysis phosphatic materials, none of which, however, looks too suitable for the dry mixing industry.

These are advances in applied chemical engineering relating to the raw materials of the industry.

In that important phase of our business, that of merchandising our products, I wonder if we are doing what so many other modern industries are doing to improve selling techniques? Are we taking the necessary steps to organize sales staffs, and to train our salesmen to be service men for the inevitable period just ahead which will demand new sales techniques and new sales approaches to correspond to the improved, changed conditions on the farm and in the fertilizer works?

Comparing fertilizer consumption of this past year with the pre-war period, we are amazed at the enormous increase. We are inclined to feel proud at this record of the industry. It is not my thought to detract from the remarkable production record made under very trying conditions of the war. The difficulties surmounted were stupendous. But, I believe, a closer study of this increase will reveal some hidden factors which should be known and appreciated for they are still operative and can be turned to our good purposes.

It is clear to me that one of the important

factors responsible for much of the recent increase in consumption is the work of the plant breeder. The plant breeder gave us hybrid corn, Clinton oats, better varieties of truck and vegetable crops. Hybrid corn has added about 800 million bushels of corn annually to the commercial crop. To produce these additional bushels required upward of 600,000 tons of nitrogen, 200,000 tons of  $P_2O_5$ , and 400,000 tons of  $K_2O$ , equivalent roughly to about 5,000,000 tons of a 12-4-8 fertilizer. Of course, all this plant food was not supplied by the fertilizer industry; most of it came from the native resources of the soil and from farm manures. But the substantial increases in commercial fertilizer demand in the Corn Belt represent needs created by these new heavier feeding, higher producing crops developed by the research of the plant breeder. In the South new breeds of cattle—Brahmin cattle crossed with native breeds—and the more efficient control of animal parasites, and the introduction of new grasses and legumes have stimulated a demand for improved pastures in all the Gulf States and in the Southeast: this demand has created opportunities for the use of commercial plant food where hardly any was used before. The fertilizer industry, despite tremendous difficulties, is meeting the increased demands with new and more than adequate facilities.

This progress is the result of the indirect approach, meaning the creation of new situations and conditions through teamwork research for the purpose of stimulating more fertilizer business. Let research develop suitable conditions that permit the establishment of a new farm industry, like tung oil plantations in Mississippi and Louisiana, or reduce the unit cost of production by increasing yield per acre, and the fertilizer industry benefits. This I declare, although indirect, is one of the most practical ways our industry as a whole and the individual units in it can best operate for the purpose of broadening the sales of fertilizer on a profitable basis—what I previously described as the obligation to discover and breed new business outlets.

#### Other Research Needed

So much for generalities. Let us now come nearer to home ground.

Last January the fertilizer industry of Maryland met with our State agronomic people at College Park. It was the first meeting of this kind since the early war years.

(Continued on page 24)



## Nitrogen Export Quotas Announced

According to an announcement from the Office of International Trade, U. S. Department of Commerce, an export quota permitting shipments of nitrogenous fertilizer containing up to 52,000 short tons of nitrogen has been established for the fiscal year July 1949 through June 1950.

The new export quota for nitrogen contained in nitrogenous fertilizer is 10,000 tons less than that for the previous fiscal year and takes into consideration recent increases in nitrogenous fertilizer production in some foreign countries, OIT said.

License applications under the new quota may be filed at any time, and will be acted upon by OIT in the order which they are received. OIT urges exporters to file applications as soon as possible, in order to permit foreign shipments to be made before the first of the year, at which time the domestic demand for nitrogenous fertilizer usually is greatest.

## V-C Opens New Bag Factory

Virginia-Carolina Chemical Corporation has announced the formal opening of a new textile and paper bag factory in Atlanta, Georgia.

The new plant, which will manufacture multiwall paper sacks and burlap and cotton bags, is under the direction of D. Harold Johnson, manager of the Bag Division of the corporation, with headquarters in Richmond, Virginia. Ernest R. Lacy, formerly of Richmond, has been appointed Southeastern District Manager, with headquarters in Atlanta, and Harold R. Stemple is superintendent in charge of plant operations.

V-C textile bags have been manufactured in Richmond, Virginia, since 1899. The new Atlanta plant expansion marks the entrance of the corporation into the multiwall paper sack field.

## Hart Elected Vice-President of Nitrogen Products, Inc.

Wilson T. Hart, formerly Chief, Fertilizer Section, Office Material Distribution, Department of Commerce, has been appointed Vice President of Nitrogen Products, Inc., New York, N. Y. He returned to the fertilizer industry on July 1st, after spending six years in Government service.

Better known to his friends as "Bill," Mr. Hart began his fertilizer career in 1911 with The Baugh & Sons Co. For twenty-two years

he was with The American Agricultural Chemical Company, leaving in 1935 to become Manager of the Chilean Nitrate Sales Corporation's Office, Columbia, South Carolina. Afterwards he was associated with The Barrett Division of Allied Chemical & Dye Corporation and went to Washington June 1, 1943, to assist in drafting price regulations for fertilizers which won for the fertilizer industry a citation for outstanding service to Government during the War period.

C. S. Edwards, President, Nitrogen Products, Inc. has stated that Mr. Hart would, for the present, make his headquarters in Washington.

## Oehm Joins Pineapple Research Institute Staff

Gus M. Oehm, until recently agricultural editor in the du Pont Company's Public Relations Department in Wilmington, Del., has joined the Pineapple Research Institute of Hawaii in Honolulu.

Mr. Oehm holds the degrees of Bachelor of Arts and Bachelor of Journalism from the University of Missouri. He has served as managing editor of the Harrisburg, Ill., *Daily Register*; correspondent for the United Press in Chicago, New York, and Berlin; and agricultural editor for the University of Arkansas, The National Fertilizer Association, American Cyanamid Company; and the Arkansas Farm Bureau. In his new position, Mr. Oehm will handle publicity, publications, and public relations for PRI.

Pineapple research in the Territory has been conducted jointly since 1914 by the companies that grow and can pineapples. Since 1917 this research has centered in experiment stations supported and operated by the industry. This research organization is now known as the Pineapple Research Institute of Hawaii, with headquarters and laboratories in Honolulu adjacent to the University of Hawaii. PRI also maintains a 96-acre branch field experiment station some miles outside of Honolulu at Wahiawa, and cooperates with the various pineapple companies in their individual research projects. Tests are also conducted on the various pineapple-growing islands of the Territory, including Oahu, Kauai, Maui, Molokai, and Lanai.

The Institute has a highly trained scientific staff, directed by Dr. E. C. Auchter, former Administrator of the Agricultural Research Administration of the U. S. Department of Agriculture.

## July Crop Report

Another season of tremendous crop production is well on its way according to the U. S. D. A. July report. Not only is the total acreage in crops the largest since 1933, but yields also are promising. While all wheat production fell 148 million bushels below earlier expectations because of unfavorable developments just before and at harvest time, the crop of 1,189 million bushels still is third largest of record. The corn acreage planted was nearly two million acres above intentions and a near-record production of 3,530 million bushels is indicated. Cotton acreage is one-seventh larger than in 1948 and development is advanced for this date. Rice sets a new record in both acreage and production. Oats will be nearly a 1.4 billion bushel crop. Hay production will be slightly less than last season. Aggregate production, based upon current forecasts may be 31 per cent above

the 1923-32 average, exceeded only by the record set last year.

Heaviest contribution to the near-record aggregate crop production is made by the feed grains as a group. Included are the second-largest corn crop in history, a large crop of oats, a relatively small barley crop and a sorghum grain crop probably less than last year, but above average. With the heavy carry-over, supplies of feed grains will be among the most liberal ever available per animal unit. Hay supplies per animal unit also will be adequate, though not as abundant as last year. Food grains are considerably below last year's level, with the wheat crop reduced to third-largest, rye production dropping below 20 million bushels, and buckwheat planted on a relatively small acreage; but the rice crop of 86 million bushels sets a new record. Among the oilseeds, the flaxseed crop is expected to be the third largest of record. Acreage of soybeans for beans will be less than last year, but above average; peanut acreage is only four-fifths of last year's, but cotton acreage is the largest since 1937. Tobacco production will be a little above last year and considerably above average. The potato crop will be below average and well below last year. Sweet potatoes will exceed last year's small outturn, but remain below average. Dry beans will fall below last year's near-record crop, but exceed average by a wide margin, while dry peas continue downward. Prospects for deciduous fruits, except apricots and prunes, are better than average.

The average upon which the 52 principal crops were planted or growing in 1949 totals over 366 million acres. This exceeds the wartime peak of over 365 million in 1944 and, in fact, is greater than in any year since 1933. The record total was 375½ million acres in 1932. Indicated acreages losses amount to 13 million acres, which is more than in any year since 1943, but near the average of the past 10 years. Over 353 million acres are thus estimated for harvest in 1949, the largest total since 1932. Nearly 2½ million acres or 0.7 per cent more than in 1948, the current acreage for harvest tops the wartime peak of 1944 by about 700,000 acres.

## Peterson Appointed Sales Manager of Arkell & Smiths

The appointment of H. C. Peterson as Sales Manager of Arkell & Smiths, manufacturers of multiwall paper bags, at Canajoharie, N. Y., has been announced by R. P. Smith, vice-president of the company.

### CROP PRODUCTION

July 1, 1949

Total Production (in Thousands)

Crop	Average 1938- 1947	1948	Indicated July 1, 1949
Corn, all, bu. ....	2,787,628	3,650,548	3,530,185
Wheat, all, bu. ....	991,950	1,288,406	1,188,690
Winter, bu. ....	726,553	990,098	932,095
All spring, bu. ....	265,397	298,308	256,595
Durum, bu. ....	36,256	44,742	48,766
Otherspring, bu. ....	229,141	253,566	207,829
Oats, bu. ....	1,234,082	1,491,752	1,379,672
Barley, bu. ....	304,741	317,037	244,104
Rye, bu. ....	35,109	26,388	19,735
Flaxseed, bu. ....	30,102	52,533	45,558
Rice, bu. ....	62,944	81,170	86,032
Hay, all, ton. ....	99,539	99,846	97,671
Hay, wild, ton. ....	11,855	12,848	12,976
Hay, alfalfa, ton. ....	32,217	34,083	37,057
Hay, clover and timothy, ton. ....	29,575	29,309	24,873
Hay, lespedeza, ton. ....	6,152	7,627	7,532
Beans, dry edible 100 lb. bag. ....	16,855	20,833	19,149
Peas, dry field, bag. ....	5,620	3,584	3,104
Potatoes, bu. ....	393,403	445,850	368,696
Sweet potatoes, bu. ....	63,626	49,806	51,938
Tobacco, lb. ....	1,718,375	1,981,730	2,025,429
Sugarcane for sugar and seed, ton. ....	5,952	6,847	8,032
Sugar beets, ton. ....	10,145	9,422	9,585
Hops, lb. ....	44,146	49,819	49,050
Apples, Com'l, bu. ....	111,114	88,407	121,081
Peaches, bu. ....	68,947	65,352	76,250
Pears, bu. ....	30,832	26,334	33,685
Grapes, ton. ....	2,736	3,044	2,995
Cherries (12 States) ton. ....	172	214	225
Apricots (3 States). ton. ....	227	247	218

## THE AMERICAN FERTILIZER

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## Army and E. C. A. Arrangement to Relieve Nitrogen Shortage

An agreement has been reached between the Army, the Economic Cooperation Administration and the Fertilizer Sub-Committee if the House Committee on Agriculture, which will offer a practical solution to the nitrogen shortage for the current fertilizer year. The former export nitrogen program of about 280,000 tons of nitrogen for Japan and South Korea has been reduced by 30,000 tons and the Army has agreed to produce all but about 16,500 tons in its three plants at Morgantown, W. Va.; West Henderson, Ky.; and San Jacinto, Texas. The balance, not to exceed 18,000 tons of nitrogen, will be purchased from its former Cactus plant at Etter, Texas, which was bought by the Phillips Chemical Company, a subsidiary of the Phillips Petroleum Company.

This will release an additional 85,000 tons of nitrogen for the domestic fertilizer market during the year which began on July 1st.

Under the new arrangement, the Army is no longer offering for sale the West Henderson plant which has a capacity of 55,000 tons a year. The committee understood that the probable buyer of this plant would convert it to the production of other materials than fertilizer nitrogen.

This 55,000 tons of nitrogen would have been made up by purchases from the Cactus plant, but this is no longer necessary.

The 85,000 tons of nitrogen which will thus be added to the domestic supply is the equivalent of 250,000 tons of ammonium nitrate, or 425,000 tons of sulphate of ammonia, or 510,000 tons of nitrate of soda.

ECA had originally scheduled 151,000 tons of nitrogen, in the form of fertilizer materials, for shipment to South Korea during the fiscal 1950. The size of this allocation was severely criticized by the committee in its recent report on nitrogen fertilizer. Thereafter, the allocation was reviewed by ECA, with the result that it was reduced to 121,000 tons of nitrogen.

In view of the agreement which has been reached, Rep. Thomas G. Abernethy, chairman of the Fertilizer Subcommittee, said he would not press for the enactment of a resolution previously introduced which would limit exports to Korea and Japan to the quantity of nitrogen produced in Army plants. Instead he will join with Senator Thomas, of Oklahoma, in support of an amendment to the Foreign Aid Appropriation Bill which would make effective this agreement. According to Mr. Abernethy, adequate quantities of nitrogen should be available for the coming crop year.

### **Louis Ware Makes European Trip**

Louis Ware, president of International Minerals & Chemical Corporation, sailed from New York on July 12th to Europe for a two-month business trip, where he will make a study of general economic conditions abroad and inspect potash mines in France and Germany in which his company has interests. He will also visit European agents and customers of the corporation. Mrs. Ware is accompanying him on the trip.

### **Buhners to Celebrate Golden Wedding Anniversary**

Congratulations are in order to Mr. and Mrs. F. F. Buhner, of Seymour, Ind., who will celebrate their golden wedding anniversary the latter part of August. Mr. Buhner, who is president of the Buhner Fertilizer Company, is one of the pioneers in the Middle-west fertilizer industry, having started the company in 1889. At the present time a new plant at Danville, Ill. has been completed by the company.

### **Polyethylene Lined Paper Bags Added to Bemis Line**

Polyethylene lined paper bags for products requiring moisture protection are now being supplied by the Paper Specialty Plant of Bemis Bro. Bag Co., St. Louis. The bags are available with either one, two or three outer walls of kraft paper, and with the liner either inserted loosely or sewn into the bottom seam of the kraft walls.

Polyethylene is a comparatively new plastic film having many of the characteristics needed for the proper packaging of foods and other products that require special protection. It is odorless, tasteless, non-toxic, acid-resistant, moistureproof, greaseproof and has excellent resistance to a wide range of chemicals. It does not become brittle at extremely low temperatures.

Paper bags with polyethylene liners are being used for packing peeled whole potatoes, sliced and French fry cut potatoes, peeled apples, and similar foods for use by hotels and restaurants. Powdered ice cream mix also receives the necessary moisture protection in polyethylene. This film also provides a satisfactory bag for oily substances—a problem that had not previously been completely solved.

### **Record Wheat Yield on Illinois Farm**

One of the highest wheat yields ever grown was reported from the Central Illinois harvest of this year's crop. On the Claude W. Thorp and Sons farm near Clinton, Illinois a 25.2 acre field of Pawnee seed wheat produced 1879 bushels for an average yield of 74.5 bushels per acre.

Crop experts of the colleges and grain trade recalled similar yields made under irrigation in the West but stated that yields in the 60-bushel bracket were considered phenomenal in the Midwest wheat area. Average yield of winter wheat for Illinois this season is estimated at 21 bushels per acre. The U. S. ten-year average is 17 bushels per acre.

The 74.5-bushel yield resulted from a combination of modern farm practices, particularly commercial fertilizers and improved plant breeding. Pawnee is a hard red winter wheat developed by the Kansas Agricultural Experiment station from a cross of two plains varieties, Kawvale and Tenmarq. Imported east to Illinois it has averaged about five bushels over established varieties in experiment station tests the past four years. To keep the original qualities in the seed they produce, Thorp's secure foundation seed from a pure source through the farm seed department of Funk Bros. Seed Co., Bloomington, Ill.

The seed for the record crop was drilled at the rate of a bushel and a half per acre last fall, following removal of a soybean crop. Five hundred pounds of 8-8-8 fertilizer per acre were broadcast before the wheat was drilled. Previously, the same year, 400 lbs. of 3-12-12 fertilizer had been applied ahead of the soybean crop. Thorp's use this heavy fertilizer program to build up the soil under a four-year rotation of clover-corn-soy beans-wheat on their 347-acre farm four miles north and two miles east of Clinton, Illinois. Three generations of Thorps have transformed the originally poor land into one of the most fertile grain farms in Illinois through crop rotations and fertilization. A "fenceless" farm, with no livestock or fencerows to spread weeds, the Thorp farm is ideal for production of seed varieties of wheat, oats, soybeans and hybrid corn. Claude Thorp operates the farm and seed business in partnership with his two sons, Carl and Ernest. The farm is completely mechanized—even to the airplane which Carl, an agricultural engineer, and Ernest, former army B-17 pilot, keep in top running order.



### A. C. S. Fertilizer Chemistry Division Announces Program

The program of the Division of Fertilizer Chemistry, American Chemical Society, has prepared a well-rounded program of papers for the meeting to be held at Atlantic City, N. J., on September 19th, 20th and 21st. The Division is headed by Chairman Jackson B. Hester, Agronomist for Campbell Soup Company, Riverton, N. J., and Vincent Sauchelli, Director of Agricultural Research, Davison Chemical Corporation, Baltimore, Md. These two officers will preside at the four sessions which will be held on the afternoon of September 19th, morning and afternoon of September 20th, and the morning of September 21st. The Tuesday sessions will be devoted to a symposium on "Sulphur in Agriculture." The papers scheduled to be presented are as follows:

#### Monday, September 19th, 2 P. M.

- Introductory Remarks, *Jackson B. Hester*  
 "Some Field Experiments with Fertilizers in Japan," *C. L. W. Swanson*  
 "Some Properties of Fertilizer Conditioning Agents," *John O. Hardesty* and *Rikio Kumagai*  
 "The Molybdenum Content of Some Common Fertilizer Materials," *H. E. Evans*, *E. R. Purvis*, and *F. E. Bear*  
 "The Value of Visible Symptoms of Trace Element Deficiencies in Plant Growth," *A. A. Nikitin*  
 "Should Trace Elements Be Added to Commercial Mixed Fertilizers?" *R. W. Ruprecht*  
 "Mineral Elements and Nitrogen in Manure versus Manure," *Jackson B. Hester*  
 "Fertilizer Evaluation of Mono- and Di-Ammonium Phosphates, By Means of Pot Cultures," *W. H. MacIntire*, *S. H. Winterberg*, *A. J. Sterges*, and *L. B. Clements*

#### Tuesday, September 20th, 10 A. M.

- Introductory Remarks, *W. W. Duecker*  
 "Relations of Microorganisms to Transformations of Sulphur in Soils," *R. L. Starkey*  
 "Sulphur Status of Indiana Soils," *B. R. Bertramson*, *Maurice Field*, and *S. L. Tisdale*  
 "The Effect of Soil Acidification on Some Chemical Properties of a Soil and Plants Grown Thereon," *D. G. Aldrich* and *F. A. Gunther*  
 "Sulphur Metabolism in Alfalfa," *M. D. Thomas*, *Russell H. Hendricks*, and *George R. Hill*

#### Tuesday, September 20th, 2 P. M.

- "Sulphur Fungicides in Fruit Production," *A. B. Groves*  
 "Sulphur Fertilization in California and Some Related Factors," *John P. Conrad*  
 "Sulphur in the American Fertilizer Industry," *Vincent Sauchelli*  
 "Sulphur in Fertilizers, Soil Amendments and Manures," *A. L. Mehning* and *Gae A. Bennett*

#### Wednesday, September 21st, 9 A. M.

- "Fertilizer Evaluation of Certain Phosphorus Materials," *W. H. MacIntire*, *S. H. Winterberg*, *L. J. Hardin*, *A. J. Sterges*, and *L. B. Clements*  
 "Potash Production—A Progress Report," *J. W. Turrentine*  
 "The Problems and Chemistry of Direct Application of Anhydrous Ammonia to the Soil," *W. B. Andrews* and *Marvin Geiger*  
 "Further Observations on the Preparation and Properties of Urea-form," *K. G. Clark*, *J. K. Yee*, *K. S. Love*, and *T. A. Boyd*  
 "Cyanamid and Related Compounds in Agriculture," *Frank L. Stark, Jr.*, and *Delmar S. Fink*  
 "Non-farm Use of Fertilizers in the United States, 1947-1948," *Walter Scholl* and *Hilda M. Wallace*

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**No Price Changes in Sulphate of Ammonia but Lower Price Quoted on Canadian Ammonium Nitrate. Heavy Demand on Organics from Feed Trade with Rising Prices. Superphosphate Contracts Quote Same Prices as Last Year. Potash Shipments on Schedule.**

*Exclusive Correspondence to "The American Fertilizer"*

NEW YORK, July 20, 1949.

**Sulphate of Ammonia**

Considerable export inquiry was noted from various countries but the available material for export was not considered large. No price changes were noted and producers were shipping on domestic contracts.

**Nitrate of Soda**

With the system of allocation ended, buyers could not buy as much as they wish but demand at the present time was said to be slow.

**Ammonium Nitrate**

One of the Canadian producers has reduced their price to \$63.00 per ton, f.o.b. Canadian shipping point, which is more in line with domestic sellers.

**Nitrogenous Material**

Some producers were sold out for nearby shipment and demand continued good from various directions.

**Organics**

Organic fertilizer materials showed renewed firmness, caused mainly by the demand from the feed trade who were heavy buyers the past week. The demand for feed has increased sharply in certain sections, due to drought conditions. Animal tankage sold at \$12.00 per unit of ammonia (\$14.59 per unit N), f.o.b. New England points which is a sharp advance over last reported sales of \$8.25 (\$10.02 per unit N). Blood sold at \$8.50 (\$10.33 per unit N) and, while not as strong as tankage, was in good demand. Soybean meal was quoted at \$72.00 per ton in bulk, f.o.b. Decatur, Ill., for prompt shipment. Linseed meal was stronger with a good bit going into dairy sections that were short of feed caused by the drought, with last sales at \$54.00 per ton in bulk, f.o.b. Minneapolis. Cottonseed meal for quick shipment was hard to locate.

**Fish Meal**

Reports of fishing were encouraging but the demand was heavy, mostly from the feed trade, and material is being shipped out as fast as it is processed. Fish scrap sold at \$175.00 per ton and ground meal at \$185.00 per ton, f.o.b. fish factories Chesapeake Bay. Fertilizer buyers were withholding their orders until they could get a better picture of the future situation.

**Castor Pomace**

With several major plants shut down, the supply of this material has been considerably reduced and there were no offerings, with last sales at \$21.00 per ton, f.o.b. production points. Demand was heavy. The outlook for increased production over the near term is poor.

**Bone Meal**

This material still scarce and hard to obtain, due to the heavy demand from the feed trade and the curtailed production. Some imported material has arrived which has helped the situation somewhat.

**Hoof Meal**

This market advanced with tankage and blood and sales were made at \$7.75 per unit of ammonia (\$9.42 per unit N) f.o.b. Chicago, with no offerings reported.

**Superphosphate**

New contracts are being signed on the same basis as last season with no price changes. Supplies are adequate at most points to take care of any expected demand. Triple superphosphate production has increased with one or two new plants now in operation.

**Potash**

Producers were shipping on the new contracts and buyers seemed inclined to take deliveries. The supply situation is said to be

good. Buyers have not been able to get all they may need but this situation may change before the season is over.

## PHILADELPHIA

**Demand for Materials Slackens. Better Supplies Expected for Coming Year. No Change in Superphosphate Contract Prices.**

*Exclusive Correspondence to "The American Fertilizer"*

PHILADELPHIA, July 18, 1949.

There is little or no demand for raw fertilizer materials and there is every reason to expect that there will be plenty of all grades obtainable throughout the coming fertilizer year. It is feared that this extra favorable outlook may slow up the placing of orders for ready mixed goods.

**Sulphate of Ammonia.**—Market remains firm although the demand for prompt shipments has slowed down materially. Production has increased and an ample future supply seems pretty well assured.

**Ammonium Nitrate.**—Canadian prices are reported reduced some \$16.50 per ton, making current market \$63.00 per ton in Canada.

**Nitrate of Soda.**—Market is quiet with sup-

plies quite equal to any probable demand. No price changes are reported.

**Blood, Tankage, Bone.**—Blood is quoted at \$8.50 per unit of ammonia (\$10.33 per unit N), with tankage at \$9.00 (\$10.94 per unit N). Hoof meal is quiet at \$7.00 per unit of ammonia (\$8.51 per unit N), while bone meal is quoted more or less nominally at \$65.00 to \$70.00 per ton and supply is exceedingly scarce.

**Castor Pomace.**—This continues in reduced production with movement only against contracts, and behind schedule.

**Fish Scrap.**—Fishing is reported to be only fair, with unground scrap quoted at \$175.00 per ton, and menhaden meal at \$185.00 to \$190.00.

**Phosphate Rock.**—Production is improving after strike delays, and demand reported fair, though slackening somewhat.

**Superphosphate.**—Contracts are being made at 76 to 77 cents per unit A.P.A.—same as last season. Demand is reported to be satisfactory and stocks fairly ample.

**Potash.**—Production has increased and contract shipments are moving according to schedule. The recent active demand for prompt shipments seems to have subsided.

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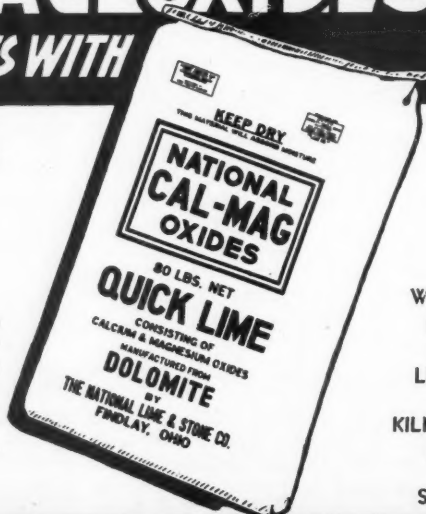
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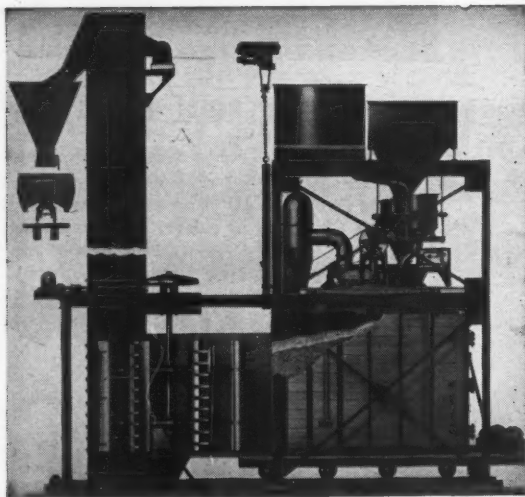
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## CHARLESTON

**Increased Production in All Basic Materials Reported. Organics Market Tight. Phosphate Rock Strike Settled.**

*Exclusive Correspondence to "The American Fertilizer"*

CHARLESTON, July 18, 1949.

Due to increased production facilities it appears now that there will be adequate supplies of the three basic ingredients, nitrogen, superphosphate and potash, for the new season. Buying interest at present is seasonal and no unusual activity in the fertilizer materials market is noted.

**Organics.**—Although the market is relatively quiet, it appears that organics will be in fairly tight supply for the new season. Castor pomace production is sold up with additional supplies uncertain. Nitrogenous tankage is offered at \$3.15 to \$4.00 per unit of ammonia (\$3.83 to \$4.86 per unit N) in bulk, f.o.b. production point, depending on its location. Sewage tankage is quoted at \$2.25 per unit of ammonia (\$2.73 per unit N), and 40 cents per unit of A.P.A., f.o.b. Chicago in bulk. Imported organics are developing very little interest, due to high prices.

**Castor Pomace.**—The producers continue sold up and the market is nominally \$21.00 per ton in bags, f.o.b. northeastern production points. No new business is reported and movement is against current contracts.

**Dried Ground Blood.**—The main interest in this article is from the feed trade and the Chicago market is reported at \$9.75 to \$10.00 per unit of ammonia (\$11.85 to \$12.15 per unit N) in bulk. The New York market is around \$8.25 to \$8.50 (\$10.02 to \$10.33 per unit N).

**Potash.**—Demand is steady and movement is in good volume against contracts. No change in prices has been noted.

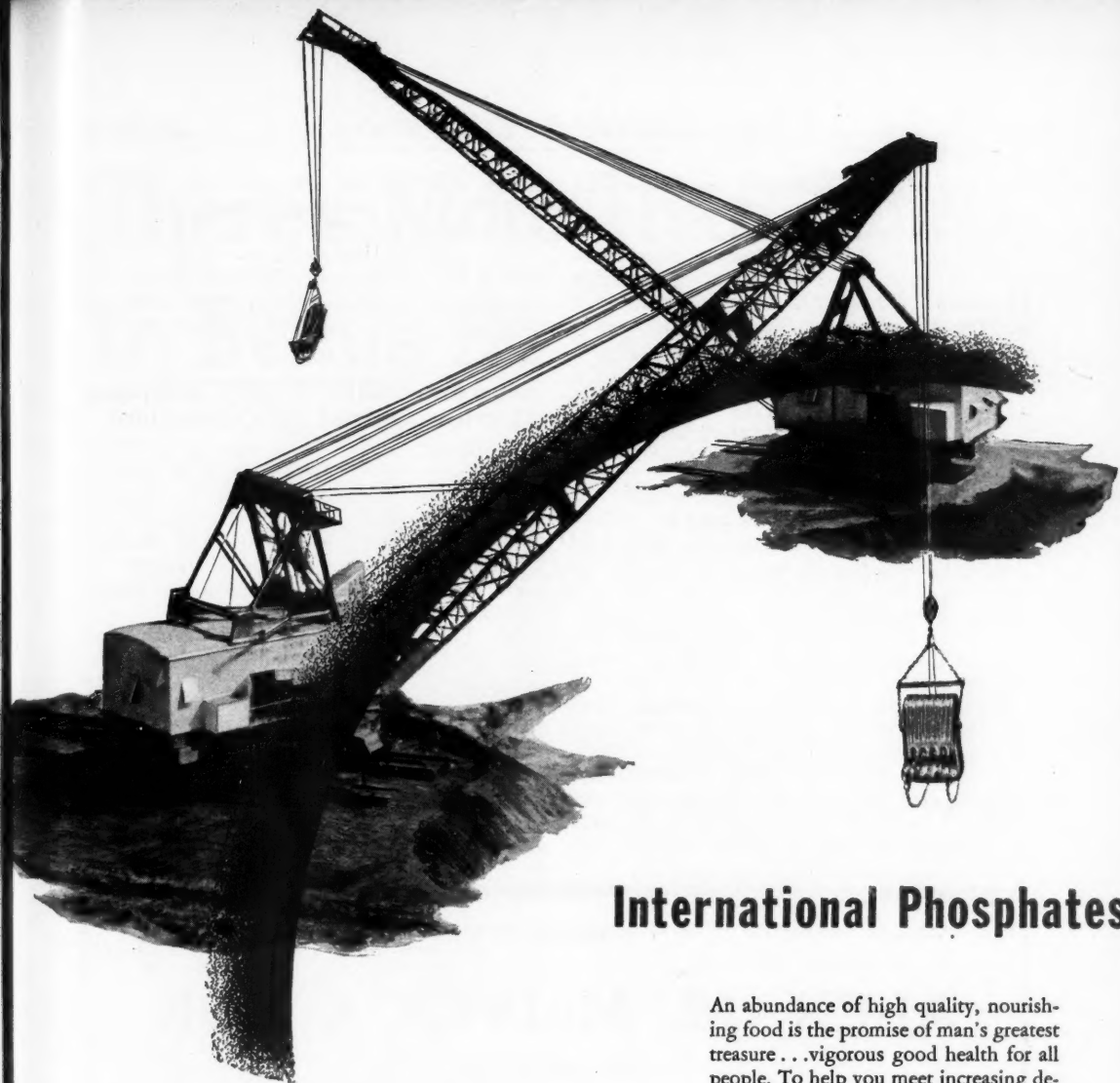
**Phosphate Rock.**—Demand continues steady, though slackening somewhat in certain areas, and production is getting back to normal after recent labor difficulties at the Florida mines.

**Superphosphate.**—Demand is seasonal and contracts are being made at prices approximately the same as during the previous season.

**Sulphate of Ammonia.**—Coke oven production is quoted at \$45.00 to \$48.00 per ton in bulk, f.o.b. the ovens. Synthetic 21 per cent nitrogen material is offered from several sources in the south at prices ranging from \$50.50 to \$54.50 in bulk.

**Nitrate of Soda.**—Demand is seasonal and





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it is expected that sufficient supplies will be available for the new season. No change in prices has been noted.

**Ammonium Nitrate.**—Due to more economical production, the price of Canadian ammonium nitrate has been reduced. The current market is \$63.00 per ton in bags in carload lots, f.o.b. Canadian shipping points.

### CHICAGO

**Strong Demands for Organic Materials and Production Falling Behind. Tankage Prices at New High.**

*Exclusive Correspondence to "The American Fertilizer"*

CHICAGO, July 18, 1949.

The market in the Chicago area on animal proteins is still in a strong position. The demand is holding up extremely well and persistent buying interest is keeping all producers in a well sold up position. As a matter of fact, current production is not keeping pace with the demand.

Meat scraps are selling anywhere from \$150.00 to \$165.00 per ton depending upon location; digester tankage, \$140.00 to \$150.00 per ton. Dry rendered tankage is very strong at \$2.75 to \$2.85 per unit of protein and wet rendered tankage, \$11.50 to \$12.50 per unit of ammonia (\$13.98 to \$15.19 per unit N).

Dried blood is also stronger with sales at \$9.75 to \$10.00 per unit of ammonia (\$11.85 to \$12.15 per unit N).

The price on steamed bone meal, 65 per cent B.P.L., advanced to \$85.00 to \$90.00 per ton and raw bone meal, 4½ per cent ammonia, 45 per cent B.P.L., is \$65.00 to \$70.00 per ton.

### Superphosphate Supply Adequate Davison Official Tells Canadians

At the 4th annual conference of the Plant Food Producers of Ontario, held at Murray Bay, Quebec, William Caspari, Jr., General Sales Manager of the Superphosphate and Phosphate Rock Divisions of The Davison Chemical Corporation, outlined factors affecting production and distribution of superphosphate.

Mr. Caspari told the Canadian group that supplies of phosphate rock and sulphur are in adequate supply, with Florida supplying about eight million tons per year of phosphate rock. While the sulphur situation is in good order, sulphuric acid is in very tight supply, especially on the Eastern Seaboard and in the North Central States, even though there has been a decline in the straight chemical use of this important material.

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"Industry has kept pace with demand," Mr. Caspari said, "by increasing rated capacity of eight million tons in 1940 to 14 million tons today. However, rated capacity means very little unless the industry strives continuously for equal monthly shipments. With a rated capacity of 14 million tons, only nine million tons were shipped, due to peak season demands."

Mr. Caspari approached the supply situation from a demand angle and stressed higher transportation costs, higher labor costs, higher land values. He said, "Higher costs all around demand intensive farming instead of extensive farming." This, he felt, will keep fertilizer demand at a higher level than heretofore.

Demand in the Coastal Plain Section will remain fairly constant with increases being satisfied by triple superphosphate, rather than normal superphosphate. In the Mississippi Valley states, demand will more than treble and will be satisfied by triple superphosphate because of ever-increasing freight rates.

U. S. Government support of prices, distribution by Production and Marketing Administration, export buying for rehabilitation of occupied areas will add to the demands on United States production.

### Error in Southern States Phosphate and Fertilizer Co. Rating

Our attention has been called to a typographical error in the May issue of the Dun and Bradstreet Register, whereby the rating of the Southern States Phosphate and Fertilizer Company of Savannah, Ga., was given as D + 1 instead of B + 1. The Dun and Bradstreet organization informs us that this error has been corrected in the current issue of their register, thus giving a correct picture of the company's financial standing of \$300,000 to \$500,000 valuation, with high credit. It is understood that an even higher rating will be given in the near future.

### Coke By-Product Report Issued

Trends in the production and value of the principal coproducts of coke—gas, tar, ammonia, and crude light oil—in the United States from 1919 through 1947 are presented in a report recently released by James Boyd, Director of the U. S. Bureau of Mines.

While these products are distinctly secondary to coke—their value in 1947 was 23.2 per cent of that of all coke-oven products, while



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that of coke and coke breeze was 76.8 per cent—the report notes that their many and varied uses have made them essential to all American industry.

The relative importance of the various coproducts as sources of revenue for the coke industry has shifted with technologic changes, the report notes. For instance, ammonia ranked first in 1919 and 1920, after which it yielded first place to gas. Partly, this was owing to the expansion of synthetic plants producing ammonia from hydrogen and atmospheric nitrogen, and partly to use of a smaller proportion of coke-oven gas for oven fuel and the sale of more of it for distribution through city mains.

The report gives production and revenue data for coke-oven gas, coke-oven tar and derivatives, crude light oil and derivatives, and coke-oven ammonia for each of the years covered. Diagrams and tables are included.

A free copy of Information Circular 7504, "Coproducts of Coke in the United States, 1919-47," by J. A. DeCarlo, commodity specialist, and J. A. Corgan, chief, Bureau Anthracite and Coke Section, can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh, Pa.

## RESEARCH AND THE LAND

(Continued from page 9)

Everybody present had an enjoyable time and got something worthwhile out of the discussions. It was my privilege to represent our industry on the program. May I have your indulgence to highlight some of the things I pointed out, in the preparation of which I had the cooperation of some colleagues from the Eastern Shore.

We believe the need exists in Maryland for a vastly greater amount of teamwork research to protect our present agricultural business and to create new opportunities in order to assure our young men and women attractive farm careers in the future. Maryland farmers now consume over 200,000 tons per year of mixed fertilizer and about 33,000 tons of stright materials. The total annual value of Maryland's richly varied agriculture exceeds 200 millions of dollars: tobacco about 16 millions, dairy production 49 millions, livestock production 25 millions, canning crops 12 millions. The agricultural business of Maryland and Delaware is relatively big business in which crops of high cash-per-acre value dominate. It is these crops which can stand the use of large amounts of complete fertilizers.

Now, many parts of the state are interested in growing new cash crops. But they lack the necessary basic information upon which to start with any hope of success. More information is wanted on developments in new varieties of truck and vegetable crops—cantaloupes, tomatoes, white and sweet potatoes adapted to local conditions and fitting into the competitive marketing picture; and in soil fumigation techniques to control nematodes and other soil enemies. We should have increased facilities for soil testing: more farmers would like to avail themselves of this type of information if the service could be improved. In neighboring

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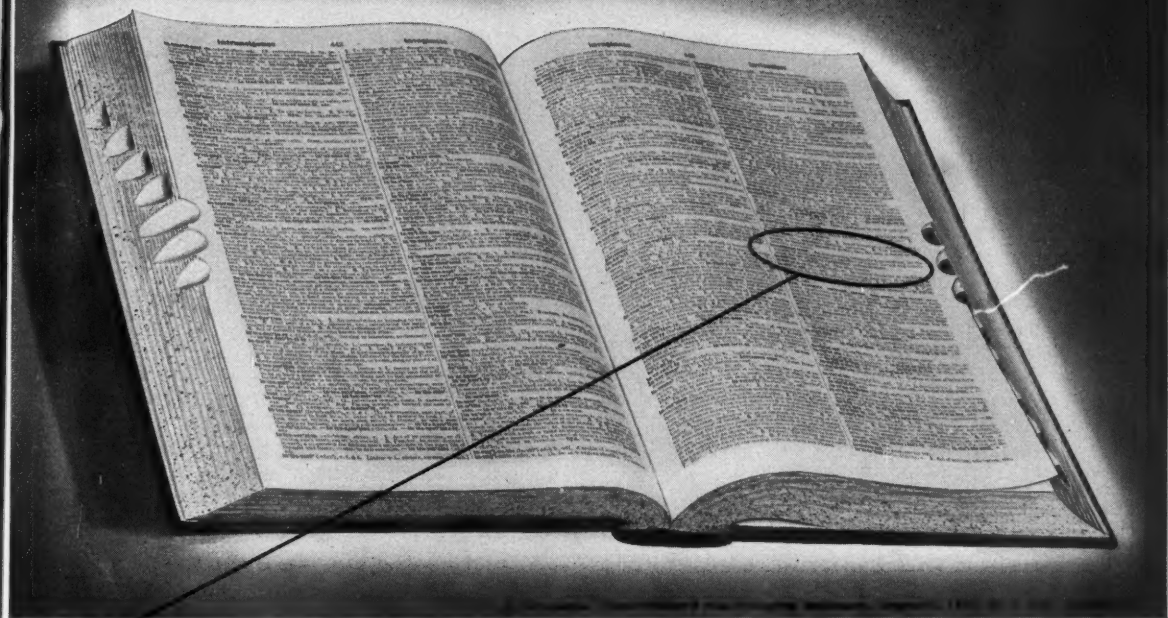
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New Jersey the state authorities can quickly handle 12,000 soil samples; in Maryland scarcely 3,000. Lack of funds at College Park and perhaps a failure on the part of farmers and fertilizer men to present their views to the authorities in a strongly organized manner may be responsible for this situation. That it should be remedied is obvious. Soil testing should be a state service and not a fertilizer industry service to farmers. A reasonable charge should be made to cover the cost of such service.

#### Minor Elements

We must know a great deal more about the need and use of the so-called minor elements. It is becoming clear to all of us in soil science and plant nutrition work that Coastal Plain soils generally are insufficiently supplied with these trace elements, and that agriculture on these soils, being of the intensive kind, cannot be profitable unless one or several of them are included in the fertilizer formulation. The fertilizer industry is ready to put them into the mixture. Field research must tell us the kinds and amounts to use. We must depend upon our local agricultural experiment stations for recommendations based on extensive field and greenhouse tests.

A perennial problem of direct interest to all of us is that which involves the number of grades sold in each state. According to Mr. L. E. Bopst, Maryland State Chemist, 77 grades were registered in Maryland in 1948. Of these, the first 10 grades in actual tonnage comprised about 87 per cent of the total. The first in rank, tonnage-wise, was 3-12-6, constituting about 47 per cent of the total tonnage sold. The record shows 597 brands of fertilizer were registered and 48 analyses were complete N-P-K goods. Too many grades are now being manufactured and sold in this State. Many of us here have for years worked hard to have these grades voluntarily reduced by industry. We have hoped against hope that educational methods would eventually bring about the desired reduction. Having discussed this matter by letter and word of mouth with many of you, I believe I am voicing majority sentiment

when I say that we believe that grades in Maryland and Delaware should be reduced by law. Many states have already done this with benefit to both manufacturer and farmer. The list so adopted would be subject to annual review by fertilizer manufacturers, farmers, and experiment station personnel called in conference by the state authorities.

#### Expanded Research Program Needed

We need an expanded agronomic research program at each of the experiment stations of this area to determine such things as:

Optimum rates of application of fertilizers for each cash crop and soil type; the most satisfactory ratios; the best positional placement for profitable yields. Farmers generally are not using optimum rates for maximum yields. Why shouldn't more farmers be getting 10 tons of tomatoes per acre instead of 5, or 100 bushels of field corn instead of 30 as an average. It can be done; it is being done. Within the past five years North Carolina farmers have been taught to increase corn yields from an average of 22 bushels per acre to 72 bushels by means of larger applications of better grades of fertilizer and better soil management practices. Fertilized pastures can be made to yield more protein and thus reduce the state's feed bill. We understand the state authorities are expanding their research projects on pastures. We urge that the work get under way soon and that the fertilizer industry cooperate fully to make

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this new potential outlet for fertilizer a large and profitable one.

Portents on today's economic horizon warn us that agriculture is in for some critical situations due to postwar readjustment. Perhaps we may not experience the drastic postwar slumps following the first World War which ended in the depression of the 30's; but we are beginning to see a significant decline in farm prices which suggests that the 1947-48 farm income marked the peak of World War II farm prosperity and, indirectly, of fertilizer industry prosperity, too.

The downward trend in farm prices calls not for worry and long faces, but for resourcefulness. Growers in Maryland will have to reckon with increasingly stiff competition from neighboring states for their markets. This puts a premium on efficiency in production and marketing procedures. And this need for increased efficiency demands research. Without a strong, comprehensive teamwork research program and the facilities and manpower with which to carry out such a program, the agriculture of this tri-state area cannot continue successfully to make its great contribution to our economic welfare. Maryland's 200 million dollar agricultural business is new wealth created each year. This is important not only to the farm communities dependent upon agricultural prosperity, but also to our fertilizer business and to the hundreds of thousands of men and women employed in food handling, processing, and all those many activities between the farm and the consumer's dinner table.

How much of that 200 millions of dollars is being set aside for research in Maryland agriculture? And of the approximately 8 million dollar fertilizer business in Maryland alone, what percentage of that huge income is being devoted to research to protect its future?

You know the answer as well as I.

#### Conclusion

The fertilizer industry nation-wide and locally has a big job to do. More of us should get the viewpoint that plant food is not merely something to sell for use on crops to increase cash returns to the farmer. Fertilizer does that, of course; but it also serves the community in saving precious topsoil, and in raising the level of human nutrition and health. The new viewpoint we need to develop is that our industry should shape its production facilities to fit the needs of the community and of agriculture for fertilizer. What our product does, or does not do, is of direct and deep concern to the entire public. We shall be wise to utilize that interest for the purpose of creating better public relations for ourselves and our industry.

Our local fertilizer industry as a whole has certain obligations to initiate and support agricultural research. We should not leave it all to the state. We can help in many ways. May I suggest the following:

1. Develop practical procedures for improving public relations by using as a basis the role of fertilizers in the economy and in the improvement and maintenance of better public health.
2. Sponsor group meetings to which federal, state, and industry research workers and fertilizer executives can attend and freely participate in discussions for the common good.
3. Subsidize research on special plant nutrient problems at local experiment stations and universities through fellowships and grants-in-aid.
4. Participate directly and cooperatively with government research agencies in the field of fertilizer use and technology. One example of this is the co-operative research project with radioactive isotopes sponsored by the industry and generously supported by industry, federal and state funds.

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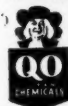
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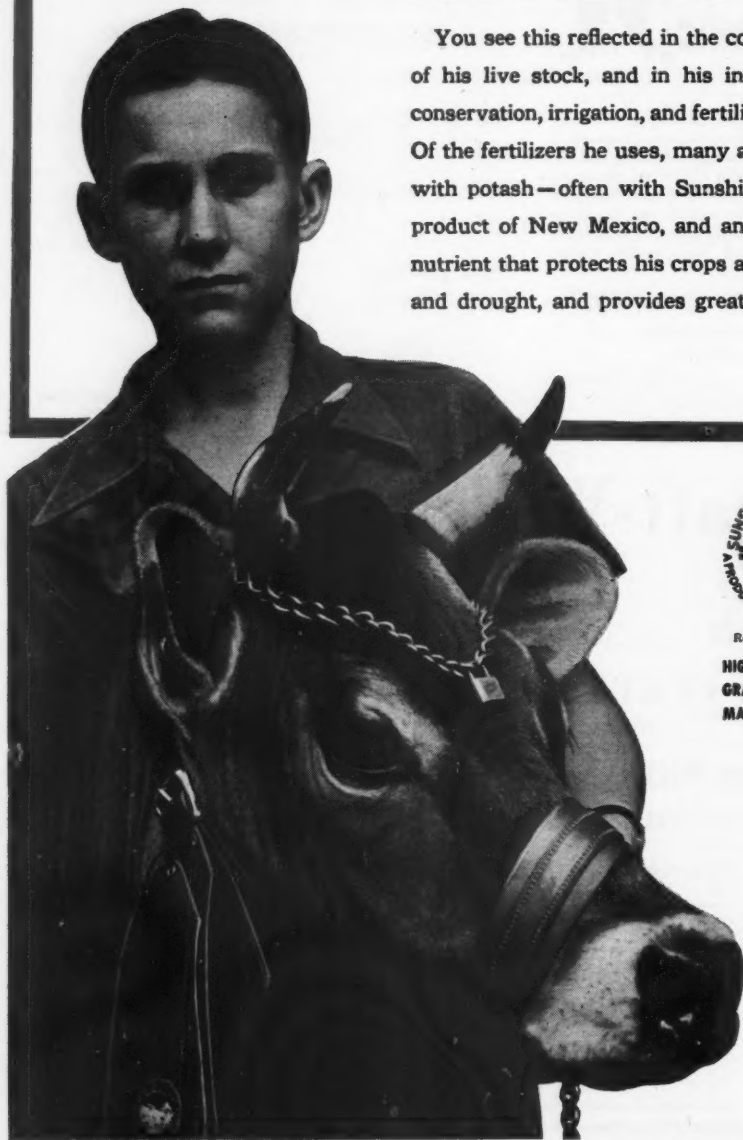
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Sackett & Sons Co., The A. J., Baltimore, Md.  
Sturtevant Mill Company, Boston, Mass.

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Ashcraft-Wilkinson Co., Atlanta, Ga.  
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Davidson Commission Co., The, Chicago, Ill.  
Huber & Company, New York City  
Jackle, Frank R., New York City  
McIver & Son, Alex. M., Charleston, S. C.  
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Woodward & Dickerson, Inc., Philadelphia, Pa.

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Davidson Commission Co., The, Chicago, Ill.  
Huber & Company, New York City  
Jackle, Frank R., New York City  
Keim, Samuel D., Philadelphia, Pa.  
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Scar-Lipman & Co., New York City  
Woodward & Dickerson, Inc., Philadelphia, Pa.

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Armour Fertilizer Works, Atlanta, Ga.  
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Baker & Bro., H. J., New York City  
Commercial Solvents Corp., New York City  
Davison Chemical Corporation, Baltimore, Md.  
Huber & Company, New York City  
International Minerals & Chemical Corporation, Chi  
Lion Oil Company, El Dorado, Ark.  
McIver & Son, Alex. M., Charleston, S. C.  
Scar-Lipman & Co., New York City  
Spencer Chemical Co., Kansas City, Mo.  
Virginia-Carolina Chemical Corp., Richmond, Va.  
Woodward & Dickerson, Inc., Philadelphia, Pa.

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Shuey & Company, Inc., Savannah, Ga.  
Wiley & Company, Baltimore, Md.

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Jackle, Frank R., New York City  
Keim, Samuel D., Philadelphia, Pa.  
National Lime & Stone Co., Findlay, Ohio  
Quaker Oats Company, Chicago, Ill.

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Sturtevant Mill Company, Boston, Mass.

Titlestad Corporation, Nicolay, New York City

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Scar-Lipman & Co., New York City  
Woodward & Dickerson, Inc., Philadelphia, Pa.

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A Classified Index to Advertisers in  
"The American Fertilizer"

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Advertisers, see page 33

### HOPPERS

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Sturtevant Mill Company, Boston, Mass.

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### LEAD BURNERS

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National Lime & Stone Co., Findlay, Ohio

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Stedman's Foundry and Mach. Works, Aurora, Ind.  
Sturtevant Mill Company, Boston, Mass.

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### MINOR ELEMENTS

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Huber & Company, New York City  
International Minerals & Chemical Corporation, Chicago, Ill.  
Jackle, Frank R., New York City  
McIver & Son, Alex. M., Charleston, S. C.  
Scar-Lipman & Co., New York City  
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Huber & Company, New York City  
International Minerals & Chemical Corporation, Chicago, Ill.  
McIver & Son, Alex. M., Charleston, S. C.  
Virginia-Carolina Chemical Corp., Richmond, Va.

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Monsanto Chemical Co., St. Louis, Mo.  
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Huber & Company, New York City  
International Minerals & Chemical Corporation, Chicago, Ill.  
Jackle, Frank R., New York City  
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Universal Vibrating Screen Co., Racine, Wis.

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McIver & Son, Alex. M., Charleston, S. C.  
Scar-Lipman & Co., New York City  
Woodward & Dickerson, Inc., Philadelphia, Pa.

### SULPHUR

Ashcraft-Wilkinson Co., Atlanta, Ga.

### SULPHURIC ACID

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Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City  
Huber & Company, New York City  
International Minerals & Chemical Corporation, Chicago, Ill.  
McIver & Son, Alex. M., Charleston, S. C.  
Scar-Lipman & Co., New York City  
Southern States Phosphate Fertilizer Co., Savannah, Ga.  
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.  
Virginia-Carolina Chemical Corp., Richmond, Va.

### SUPERPHOSPHATE

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Armour Fertilizer Works, Atlanta, Ga.  
Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City  
Davison Chemical Corporation, Baltimore, Md.  
Huber & Company, New York City  
International Minerals & Chemical Corporation, Chicago, Ill.  
Jackle, Frank R., New York City  
Scar-Lipman & Co., New York City  
Southern States Phosphate Fertilizer Co., Savannah, Ga.  
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.  
Virginia-Carolina Chemical Corp., Richmond, Va.

### SUPERPHOSPHATE—Concentrated

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International Minerals & Chemical Corporation, Chicago, Ill.  
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.  
Virginia-Carolina Chemical Corp., Richmond, Va.

### TAGS

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### TANKAGE

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Ashcraft-Wilkinson Co., Atlanta, Ga.  
Baker & Bro., H. J., New York City  
Davison Commission Co., The, Chicago, Ill.  
International Minerals & Chemical Corporation, Chicago, Ill.  
Jackle, Frank R., New York City  
McIver & Son, Alex. M., Charleston, S. C.  
Scar-Lipman & Co., New York City  
Woodward & Dickerson, Inc., Philadelphia, Pa.

### VALVES

Atlanta Utility Works, The, East Point, Ga.  
Monarch Mfg. Works, Inc., Philadelphia, Pa.

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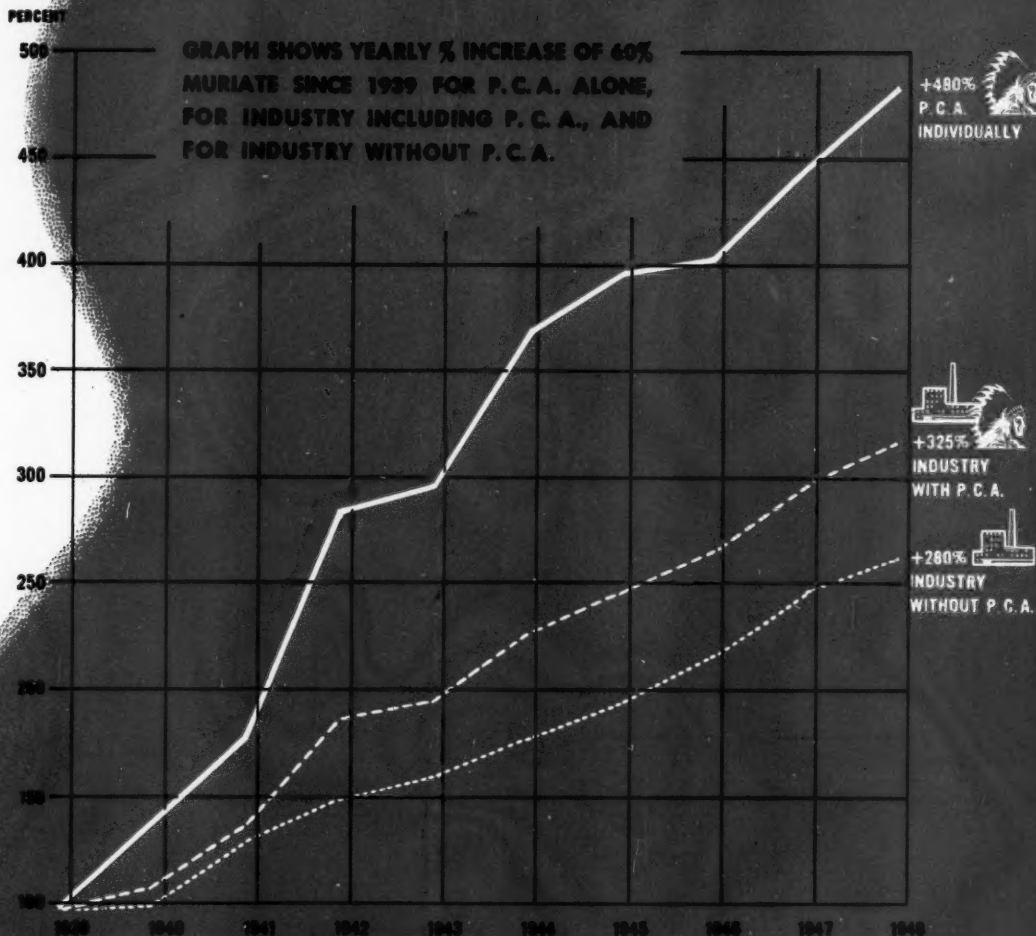
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